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Perspective | [Published: 01 April 2021](#)

## Ethical choices behind quantifications of fair contributions under the Paris Agreement

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[Nature Climate Change](#) **11**, 300–305 (2021)

**4088** Accesses | **23** Citations | **77** Altmetric | [Metrics](#)

### Abstract

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The Parties to the UNFCCC and Paris Agreement agreed to act on the basis of equity to protect the climate system. Equitable effort sharing is an irreducibly normative matter, yet some influential studies have sought to create quantitative indicators of equitable effort that claim to be value-neutral (despite evident biases). Many of these studies fail to clarify the ethical principles underlying their indicators, some mislabel approaches that favour wealthy nations as ‘equity approaches’ and some combine contradictory indicators into composites we call derivative benchmarks. This Perspective reviews influential climate effort-sharing assessments and presents guidelines for developing and adjudicating policy-relevant (but not ethically neutral) equity research.

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## References

1. *United Nations Framework Convention on Climate Change* (UNFCCC, 1992); <http://unfccc.int/resource/docs/convkp/conveng.pdf>
2. *The Paris Agreement* (UNFCCC, 2015).
3. Sarewitz, D. How science makes environmental controversies worse. *Environ. Sci. Policy* **7**, 385–403 (2004).
4. Howarth, D. Power, discourse, and policy: articulating a hegemony approach to critical policy studies. *Crit. Policy Stud.* **3**, 309–335 (2010).
5. Beck, S. & Mahony, M. The IPCC and the new map of science and politics. *WIREs Clim. Change* **9**, e547 (2018).

6. Miller, C. A. & Edwards, P. N. *Changing the Atmosphere: Expert Knowledge and Environmental Governance* (MIT Press, 2001).

---

7. Klinsky, S. et al. Why equity is fundamental in climate change policy research. *Glob. Environ. Change* **44**, 170–173 (2017).

---

8. Vanderheiden, S. *Atmospheric Justice: A Political Theory of Climate Change* (Oxford Univ. Press, 2008).

---

9. Ciplet, D., Roberts, J. T. & Mizan, R. K. *Power in a Warming World* (MIT Press, 2015).

---

10. Agarwal, A. & Narain, S. *Global Warming in an Unequal World: A Case of Environmental Colonialism* (Centre for Science and Environment, 1991).

---

11. Shue, H. Subsistence protection and mitigation ambition: necessities, economic and climatic. *Br. J. Polit. Int. Relat.* **21**, 251–262 (2019).

---

12. Vaillancourt, J. G. in *Environmental Sociology: Theory and Practice* (eds Meha, M. D. & Ouellets, E.) 219–230 (Captus Press, 1995).

---

13. Sen, A. *Development as Freedom* (Oxford Univ. Press, 1999).

---

14. Shue, H. Subsistence emissions and luxury emissions. *Law Policy* **15**, 39–60 (1993).

---

15. Caney, S. in *The Ethics of Global Climate Change* (Cambridge Univ. Press, 2011).

---

16. Kartha, S. et al. Cascading biases against poorer countries. *Nat. Clim. Change* **8**, 348–349 (2018).

---

17. Meyer, L. H. & Roser, D. Climate justice and historical emissions. *Crit. Rev. Int. Soc. Polit. Phil.* **13**, 229–237 (2010).

---

18. Moellendorf, D. Responsibility for increasing mitigation ambition in light of the right to sustainable development. *Fudan J. Human. Soc. Sci.* **13**, 189–190 (2020).

---

19. Gosseries, A. Luck egalitarianism and the greenhouse effect. *Can. J. Phil.* **35**, 279–309 (2005).

---

20. Caney, S. Just emissions. *Philos. Public Aff.* **40**, 255–300 (2012).

---

21. Schmidt, B. C. Principle and prejudice: the Supreme Court and race in the progressive era. Part 3: black disfranchisement from the KKK to the grandfather clause. *Columbia Law Rev.* **82**, 835–905 (1982).

---

22. Caney, S. in *The Stanford Encyclopedia of Philosophy* (ed. Zalta, E. N.) (Metaphysics Research Lab, Stanford University, 2020);  
<https://plato.stanford.edu/entries/justice-climate/>

---

23. Shue, H. *Basic Rights: Subsistence, Affluence, and U. S. Foreign Policy* (Princeton Univ. Press, 2020).

---

24. Singer, P. *One World: The Ethics of Globalization* (Yale Univ. Press, 2004).

---

25. Moellendorf, D. *The Moral Challenge of Dangerous Climate Change: Values, Poverty, and Policy* (Cambridge Univ. Press, 2014).

---

26. Caney, S. *Justice Beyond Borders: A Global Political Theory* (Oxford Univ. Press, 2005).

---

27. Brock, G. (ed.) *Necessary Goods: Our Responsibilities to Meet Others' Needs* (Rowman and Littlefield, 1998).

---

28. Watson, R., McCarthy, J. J., Canziani, P., Nakicenovic, N. & Hisas, L. *The Truth Behind the Climate Pledges* (Fundación Ecológica Universal (FEU-US), 2019).

---

29. Raupach, M. R. et al. Sharing a quota on cumulative carbon emissions. *Nat. Clim. Change* **4**, 873–879 (2014).

---

30. Hayward, T. Human rights versus emissions rights: climate justice and the equitable distribution of ecological space. *Ethics Int. Aff.* **21**, 431–450 (2007).

---

31. Aristotle *Nicomachean Ethics* 1131a23-24

---

32. Adger, N. W., Paavola, J. & Huq, S. in *Fairness in Adaptation to Climate Change* (eds Adger, N. W. et al.) 1–19 (MIT Press, 2006).

---

33. Muttitt, G. & Kartha, S. Equity, climate justice and fossil fuel extraction: principles for a managed phase out. *Clim. Policy* **20**, 1024–1042 (2020).

---

34. Wallimann-Helmer, I., Meyer, L., Mintz-Woo, K., Schinko, T. & Serdeczny, O. in *Loss and Damage from Climate Change: Concepts, Methods and Policy Options* 39–62

(Springer, 2019).

- 
35. Rogelj, J. & Schleussner, C.-F. Unintentional unfairness when applying new greenhouse gas emissions metrics at country level. *Environ. Res. Lett.* **14**, 114039 (2019).
- 
36. Klinsky, S. & Winkler, H. Building equity in: strategies for integrating equity into modelling for a 1.5 °C world. *Phil. Trans. R. Soc. A* **376**, 20160461 (2018).
- 
37. Höhne, N., Elzen, M. & Escalante, D. Regional GHG reduction targets based on effort sharing: a comparison of studies. *Clim. Policy* **14**, 122–147 (2014).
- 
38. van den Berg, N. J. et al. Implications of various effort-sharing approaches for national carbon budgets and emission pathways. *Climatic Change* **162**, 1805–1822 (2019).
- 
39. Parra, P. et al. *Equitable Emissions Reductions Under the Paris Agreement* (CAT, 2017); [https://climateactiontracker.org/documents/56/CAT\\_2017-09-19\\_EquityUpdate\\_BriefingPaper.pdf](https://climateactiontracker.org/documents/56/CAT_2017-09-19_EquityUpdate_BriefingPaper.pdf)
- 
40. *Comparability of Effort* (CAT, 2017); <https://climateactiontracker.org/methodology/comparability-of-effort/>
- 
41. Robiou du Pont, Y. et al. Equitable mitigation to achieve the Paris Agreement goals. *Nat. Clim. Change* **7**, 38–43 (2017).
- 
42. Pan, X., Den Elzen, M., Höhne, N., Teng, F. & Wang, L. Exploring fair and ambitious mitigation contributions under the Paris Agreement goals. *Environ. Sci. Policy* **74**,

49–56 (2017).

---

43. Robiou du Pont, Y. & Meinshausen, M. Warming assessment of the bottom-up Paris Agreement emissions pledges. *Nat. Commun.* **9**, 4810 (2018).

---

44. Meinshausen, M. et al. National post-2020 greenhouse gas targets and diversity-aware leadership. *Nat. Clim. Change* **5**, 1098–1106 (2015).

---

45. Peters, G., Andrew, R. M., Solomon, S. & Friedlingstein, P. Measuring a fair and ambitious climate agreement using cumulative emissions. *Environ. Res. Lett.* **10**, 105004 (2015).

---

46. Pozo, C., Galán-Martín, Á., Reiner, D. M., Mac Dowell, N. & Guillén-Gosálbez, G. Equity in allocating carbon dioxide removal quotas. *Nat. Clim. Change* **10**, 640–646 (2020).

---

47. Clarke, L. et al. in *Climate Change 2014: Mitigation of Climate Change* (eds Edenhofer, O. et al.) Ch. 6 (IPCC, Cambridge Univ. Press, 2014).

---

48. IPCC *Climate Change 2014: Mitigation of Climate Change* (eds Edenhofer, O. et al.) (Cambridge Univ. Press, 2014).

---

49. Pan, J. Meeting human development goals with low emissions: an alternative to emissions caps for post-Kyoto from a developing country perspective. *Int. Environ. Agreem.* **5**, 89–104 (2005).

---



50. Kolstad, C. et al. in *Climate Change 2014: Mitigation of Climate Change* (eds Edenhofer, O. et al.) Ch. 3 (IPCC, Cambridge Univ. Press, 2014).
- 
51. Fleurbaey, M. et al. in *Climate Change 2014: Mitigation of Climate Change* (eds Edenhofer, O. et al.) Ch. 4 (IPCC, Cambridge Univ. Press, 2014).
- 
52. Holz, C., Kartha, S. & Athanasiou, T. Fairly sharing 1.5: national fair shares of a 1.5 °C-compliant global mitigation effort. *Int. Environ. Agreem.* **18**, 117–134 (2018).
- 
53. Sælen, H., Tørstad, V., Holz, C. & Nielsen, T. D. Fairness conceptions and self-determined mitigation ambition under the Paris Agreement: is there a relationship? *Environ. Sci. Policy* **101**, 245–254 (2019).
- 
54. Anderson, K., Broderick, J. F. & Stoddard, I. A factor of two: how the mitigation plans of 'climate progressive' nations fall far short of Paris-compliant pathways. *Clim. Policy* **20**, 1290–1304 (2020).
- 
55. McMullin, B., Price, P., Jones, M. B. & McGeever, A. H. Assessing negative carbon dioxide emissions from the perspective of a national "fair share" of the remaining global carbon budget. *Mitig. Adapt. Strateg. Glob. Change* **25**, 579–602 (2020).
- 
56. Fyson, C. L., Baur, S., Gidden, M. & Schleussner, C.-F. Fair-share carbon dioxide removal increases major emitter responsibility. *Nat. Clim. Change* **10**, 836–841 (2020).
- 
57. Schlosberg, D. *Defining Environmental Justice: Theories, Movements, and Nature* (Oxford Univ. Press, 2007).
-

58. Wesselink, A., Buchanan, K. S., Georgiadou, Y. & Turnhout, E. Technical knowledge, discursive spaces and politics at the science–policy interface. *Environ. Sci. Policy* **30**, 1–9 (2013).
- 
59. Oppenheimer, M. et al. *Discerning Experts: The Practices of Scientific Assessment for Environmental Policy* (Univ. Chicago Press, 2019).
- 
60. Fraser, N. Recognition without ethics? *Theory Cult. Soc.* **18**, 21–42 (2001).
- 
61. Stirling, A. “Opening up” and “closing down”: power, participation, and pluralism in the social appraisal of technology. *Sci. Technol. Hum. Values* **33**, 262–294 (2008).
- 
62. Winkler, H. Reducing inequality and carbon emissions: innovation of developmental pathways. *S. Afr. J. Sci.* **114**, 1–7 (2018).
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## Contributions

All authors contributed to the conception of the work. K.D., C.H., S. Kartha, S. Klinsky, H.S., T.R. and H.W. jointly wrote the paper. K.D., C.H., S. Kartha and G.H. contributed to the analysis and interpretation of data, including the figures. All authors contributed to discussions of revisions and improvements to this paper.

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## Ethics declarations

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Competing interests

The authors declare no competing interests.

## Additional information

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**Peer review information** *Nature Climate Change* thanks Sudhir Rajan, Narasimha Rao, Steve Vanderheiden and the other, anonymous, reviewer(s) for their contribution to the peer review of this work.

**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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### [Supplementary Data 1](#)

Supplementary data containing Supplementary Tables 1 (Overview of reviewed studies) and 2 (Analysis for Figs. 1 and 2).

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Cite this article

Dooley, K., Holz, C., Kartha, S. *et al.* Ethical choices behind quantifications of fair contributions under the Paris Agreement. *Nat. Clim. Chang.* **11**, 300–305 (2021). <https://doi.org/10.1038/s41558-021-01015-8>

### Received

22 July 2020

### Accepted

01 March 2021

### Published

01 April 2021

### Issue Date

April 2021

**DOI**

<https://doi.org/10.1038/s41558-021-01015-8>

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Nature Climate Change (*Nat. Clim. Chang.*) | ISSN 1758-6798 (online) | ISSN 1758-678X (print)